

Redescription of some *Microchaetus* Rapp, 1849 species based on type material in the Natal Museum (Oligochaeta: Microchaetidae)

by

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ABSTRACT

Four species, *Microchaetus parvus*, *caementarii*, *marleyi* and *warreni*, described by Michaelsen (1913a b, 1928), and *M. natalensis* (Kinberg, 1867) are examined, redescribed and illustrated. Previously overlooked type material, and newly collected specimens, were studied.

INTRODUCTION

The Natal Museum collection of Oligochaeta includes type material of species described or revised by Michaelsen (1899 1913a b 1928), which were overlooked by Reynolds & Cook (1976 1981) when they published their catalogue of type specimens and subsequent Supplement. The aim of this paper is to provide new information on these poorly known species through re-examination of type specimens, and examination of new topotypical material or material collected close to the type localities.

Information provided under the heading 'material examined' is derived entirely from specimen labels; data not found on the original labels are given in square brackets. The drawings were made with the aid of a drawing-tube attached to a Wild M5 stereomicroscope; photographs were taken using a Wild M3Z photomicroscope.

Abbreviations used in this paper:

- NMSA = Natal Museum, Pietermaritzburg, South Africa.
NMSA/Olig. = Oligochaeta collection of the Natal Museum.
BMNH = The Natural History Museum, London, U. K.
NHRS = Naturhistoriska Riksmuseet, Stockholm, Sweden.
ZMUH = Zoologisches Institut, Universität Hamburg, Germany.

TAXONOMY

Microchaetus parvus Michaelsen, 1913

Figs 1–2

Microchaetus parvus Michaelsen, 1913a:445; 1918:331; Reynolds & Cook, 1976:152

Michaelsen (1913a) described this species on a unique specimen, deposited at the time of description in the NMSA, Pietermaritzburg. Reynolds & Cook (1976) did not locate the holotype, and simply stated: 'Typus amissus'.

Material examined: Holotype: [SA, NATAL] 'Hilton Rd., [29°34'S:30°18'E]

eleven miles N. W. of Pietermaritzburg; Dr E. Warren. — July 28, 1905', one alcohol-preserved, dissected specimen with its inner parts removed from segment 9 to 22; both parts in separated tubes in one jar, labelled by Michaelsen. NMSA type No. 449; (old Accession No. 460), accession No. NMSA/Olig.00270.

New records: Natal: Otto's Bluff (29°30'S:30°23'E), on the bank of local stream, 1 clitellate specimen, 6 December, 1989; NMSA/Olig.00312. Pietermaritzburg: Wembley, Old Howick Rd., from fallow ground, 9 February 1989, 1 clitellate specimen; NMSA/Olig.00333. Scottsville (29°37'S:30°24'E), Washington Rd., from first 20 cm of fallow ground, 1 clitellate, 26 January 1989; in formaldehyde; NMSA/Olig.00385. Thornville (29°44'S:30°23'E), cultivated field with maize, black, rich soil; at 30 cm depth and between roots of plants, 5 mature specimens; 9 January 1989, alcohol preserved; NMSA/Olig.00394. Vernon Crookes Nature Reserve (30°18'S:30°40'E), near tourist camp, from compost soil at 1–20 cm depth; 1 mature, 1 semimature, 1 juvenile, 8 March 1989, alcohol preserved; NMSA/Olig.00381. All new material collected by J. D. Plisko.

The holotype dissected by Michaelsen and its excised inner organs, were immersed in the jar, together with the dissected specimen. Attached to the specimen is a label bearing generic and specific names, '*Microchaetellus parvus*-type', the date of collection, 'July 28th, 1905', and illegible name of the collector, all evidently in Michaelsen's handwriting. In his publication Michaelsen, however, used the generic name '*Microchaetus*' and read the illegible name as 'Dr. M. A.' which is erroneous as the NMSA Accession records for this material give 'Dr. E. Warren leg., 1905'.

Michaelsen's description of external characters is clearly based on the holotype. The setae, which he described as 'rather small; occur apparently from the third segment', are found to be conspicuous and relatively large, distantly paired, and first pairs occurring on the second segment. These setal characteristics were also found in all new material.

The male pores indicated by Michaelsen as occurring in intersegmental furrow 16/17 or '(15–16 ?)' can not be seen in the holotype; in new material they are in 15/16 or ? 14/15 furrows.

Due to its condition, internal characters of the holotype are difficult to see. Partly decomposed, and dried at some stage, the brittle specimen is not adequate for proper examination; excised oesophageal and intestinal segments 9–22 include some tiny parts of spermiductal funnels, but their identity is not certain.

The description of the holotype given by Michaelsen, matches my new material, with the exception of the spermiductal funnels. Michaelsen described one pair of spermiductal funnels (ie. proandric); he wrote: 'one pair of sperm-duct funnels occur ventrally in the tenth segment enclosed in an unpaired common seminal vesicle. The lateral posterior corners of the vesicle are prolonged into a pair of somewhat broadened sac-like sperm-sacs, which seem to project into the eleventh segment'. The new material has two spermiductal funnels, enclosed in two closely adjacent, unpaired sacs. This character transfers the species into the holandric group, and so a close relationship to *M. modestus*, as Michaelsen suggested, is incorrect.

Description based on new material:

External characters

General: Body cylindrical.

Colour: Preserved in alcohol anteriorly pinkish-white or pale grey with brownish tint; posteriorly pale grey.

Dimensions: Mature specimens: 42–65 mm long, 2 mm wide at segment 10, 4 mm in tubercula pubertatis area; immature: 46–82 mm long, 2 mm wide at segment 10.

Segment number: 111–249; (mature 111–198; immature 158–249).

Prostomium: Prolobous, not distinguished from first segment.

Segmentation: 1–2 not distinct from one another; 3 simple; 4–8 divided into 2 ringlets of approximately equal size and similar appearance; 9 with 2 ringlets of which first is twice as long as second; all following segments from 10 are simple.

Setae: Rather large; not very closely paired; $aa > bc$, $ab = cd$, dd about half u ; first pairs at segment 2.

Nephridial pores: In c setal lines; first pores in $3/4$ intersegmental furrow.

Female pores: Paired, on 14, in front of b setae.

Male pores: In 14/15 or 15/16 intersegmental furrow (or in both furrows ?), in line of tubercula pubertatis.

Spermathecal pores: Difficult to trace, in intersegmental furrows 12/13 and 13/14.

Clitellar region (Figs 1–2)

Clitellum: Saddle-shaped, milk-white, on 13–21, 22 with clear intersegmental furrows.

Tubercula pubertatis: Distinct longitudinal ridges, on 14, 15–18, between setal lines c and b .

Papillae: Oval-shaped, in a setal lines, on 10–13 or 10–15 and 19–22, 23 or extended to 26. Specimen from Vernon Crookes Nature Reserve has in addition square papillae on segment 14 in b setal lines.

Internal characters

Septa: 4/5 thickened, elastic, strong; 5/6 thin; 6/7 tender, only partly developed; 7/8 and 8/9 thickened, much stronger than these of clitellar region.

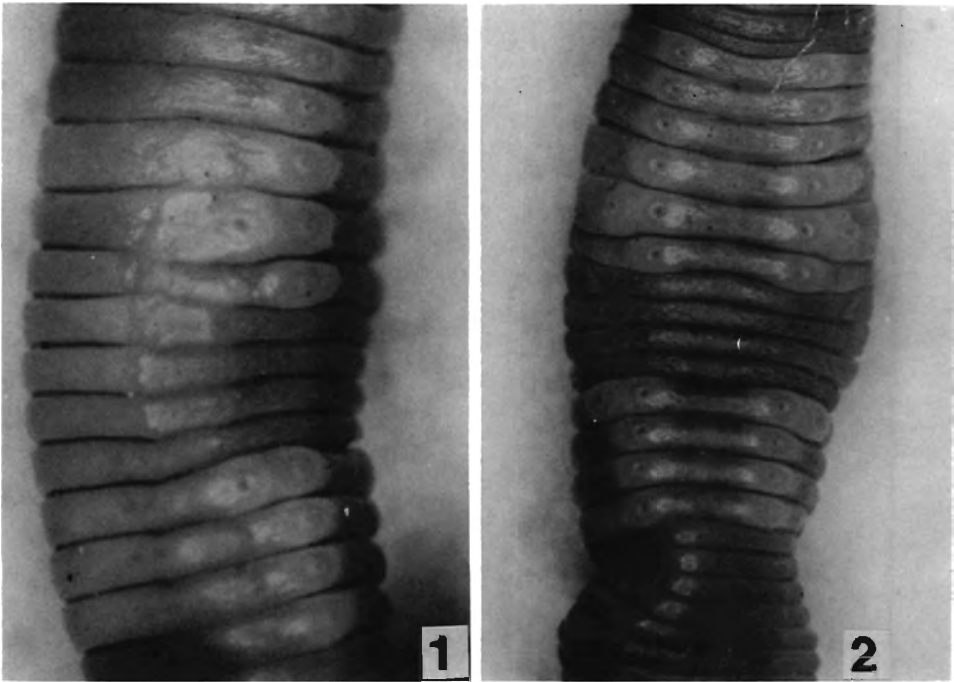
Gizzard: In segment 7.

Calciferous glands: In segment 9; globular, lateral oesophageal appendages.

Intestine: Commences in segment 13.

Dorsal blood vessel: single in segments 5–6; in segment 7 doubling manifests in the middle of the gizzard but vessel is not divided; doubled, divided into thin tubes in 8; in 9 as cordiform container, internally divided into two enlarged trunks; in 10 and the following single.

Paired dorsoventral commissural vessels: In 5–11: thin tubes in 5–8; slightly enlarged, moniliform, in 9–11.



Figs 1–2. *Microchaetus parvus* Michaelsen, 1913. Clitellar region: 1. Laterally. 2. Ventrally.

Nephridia: One pair per segment; meganephridia; numerous tufted, coiled loops with J-shaped caeca.

Spermiductal funnels: Obvious; two pairs; in segments 10 and 11; enclosed ventrally into unpaired two testicle sacs closely adherent one to another and projecting into vesiculae seminales of the some segments.

Vesiculae seminales: Two unpaired sperm-sacs in segments 10 and 11, and one pair in segment 12.

Spermathecae: Large, pear-shaped with short, curved stalk; one pair per segment in 13 and 14.

Ovaria: Funnel-shaped, attached to septum 13/14.

Genital glands: Three pairs associated with seta of segments 10–12.

Microchaetus caementerii Michaelsen, 1913

Figs 3–6

Microchaetus papillatus Benham, 1892 var. *caementerii* Michaelsen, 1913a:429; Reynolds & Cook, 1976:83

Microchaetus caementerii Michaelsen, 1918:321; Pickford, 1975:23

Microchaetus caementerii cf. *M. papillatus* var. *caementerii*; Reynolds & Cook, 1976:83

Described on three mature and several half-mature specimens, collected in two samples from Pietermaritzburg [29°35'S:30°25'E], and one from nearby Howick

[29°37'S:30°14'E]. Reynolds & Cook (1976) state that the type and paratypes are deposited in ZMUH, under Nos: 7659, 7664, 7761. The paratype deposited in the NMSA was not recorded by these authors.

Material examined: Paratype: [SA, Natal]: 'St. Peter's Churchyard, Pietermaritzburg; February, 1905, E. Warren leg.' One clitellate, dissected specimen, slightly decomposed at posterior part but well preserved anteriorly. Specimen has two labels: one with collection data, the second with species and variety names; both labels in Michaelsen's handwriting. NMSA Type No. 448 (old accession No. 307), accession No. NMSA/Olig.00259.

New records: Natal: Karkloof Falls Nature Reserve, Safari World, (29°25'S:30°18'E), ca 850 m asl; near local water reservoir, from wet soil at 1–20 cm depth; 4 January 1989, 1 clitellate and 4 juvenile specimens, J. D. Plisko leg. NMSA/Olig.00341–342. Otto's Bluff (29°30'S:30°23'E), on the bank of local river, 3 clitellate and 7 juvenile specimens, 6 December, 1989, J. D. Plisko leg. NMSA/Olig.00314. Pietermaritzburg: at the corner of Boshoff & Longmarket Street, from wet soil of city lawns; 5 March 1989, 1 whole specimen and 1 excised anterior part, both mature, clitellate, J. D. Plisko leg. NMSA/Olig.00360. Victoria Rd. 18 March 1913, 3 juvenile specimens; May 1913, 8 mature or semi-mature specimens; Jim [Jim Makanya] leg. NMSA/Olig.00358–359. Scottsville [29°36'S:30°24'E], Alexander [Alexandra] Rd. 21 February 1914, Jim Makanya leg. NMSA/Olig.00356.

This species was described as a variation of *M. papillatus* Benham, 1892. Characters of the paratype agree with the description given by Michaelsen (1913a). Some characters, however, were not considered by him.

External characters

General: Body cylindrical, much flattened in clitellar region, slightly posteriorly.

Colour: In life, dorsally dark grey with violet-green tint; ventrally light grey. Preserved in alcohol grey or yellow.

Dimensions: Alcohol-preserved, contracted, mature: 240–480 mm long, 13–15 mm wide at segment 10, 18–22 mm wide in tubercula pubertatis area; stretched juvenile 200–530 mm long, 10–12 mm wide.

Segment number: 437–610.

Prostomium: Prolobous.

Segmentation: 1–2 simple with irregular longitudinal grooves; segment 3 with 2 annuli, not clearly separated, of similar size but different appearance: first with irregular, longitudinal grooves, second simple; 4–6 with 2 ringlets, each divided by incomplete transverse lines into two annuli, creating 4 annuli per segment; segment 7 with 2 ringlets, divided into 5 annuli with formula (2 + 3); segments 8–9 with 3 annuli each, of similar appearance; 10–11 with 4 annuli each. Clitellar segments simple, randomly marked by irregular grooves. Postclitellar segments simple or irregularly demarcated into 2–3 annuli.

Setae: Paired, with different setal distances over the body length: anteriorly *ab* and *cd* setal lines with wider distances than posteriorly; *aa* = *bc*, *ab* = *cd*,

dd = *circa* half of *u*; first pairs on segment 2 or 3, than on all annulated segments on second annulus of first ringlet.

Nephridial pores: In front of *c* setal lines; first pair in 2/3 intersegmental furrow.

Female pores: Paired; in segment 14, front of *a* setae, close to intersegmental furrow.

Male pores: Not visible; probably in segments 17 or 18, or in 17/18 intersegmental furrow.

Spermathecal pores: In 11/12 and 12/13; 3–5 on each side, easier to see on living specimens, difficult to trace on old preserved material. Number of pores does not match number of spermathecae (see below under description of spermathecae).

Clitellar region

Clitellum: Saddle shaped, brownish-grey or yellow; distinctly bordered anteriorly and posteriorly, ventrally extends up to *c* setal lines; on segments 12–24.

Tubercula pubertatis (Fig. 3–4): On segments 16, 17–20; rimmed longitudinal ridges, broadened most distinctly at 17–18; slightly above *cd* setal lines; flat copulatory cushions surrounded by thin, wall-like rim, extend medially up to a half or even three-quarters of the distance between *c* and *b* setal lines.

Papillae (Fig. 5): Large or small glands, with nipples or simple, on many clitellar segments; mostly, in *ab* setal lines, on 14 and 15; or 12, 15 and 19; or 12, 14, 15, 27, 28; can occur in *ab* or *cd* setal lines, on some clitellar segment.

Variations in clitellar region: There is a small degree of individual variation in size and shape of tubercula pubertatis, which may occupy the whole 16 segment or its half or one quarter of segment, or occur only on 17–20. In all cases the copulatory cushions are distinct. The wall-like rim may differ slightly, being clearly demarcated laterally, but diminishing medially. Variation in size and number of papillae in this species is large, and can be compared only to similar variability of this character in *M. papillatus* Benham, 1892.

Internal characters

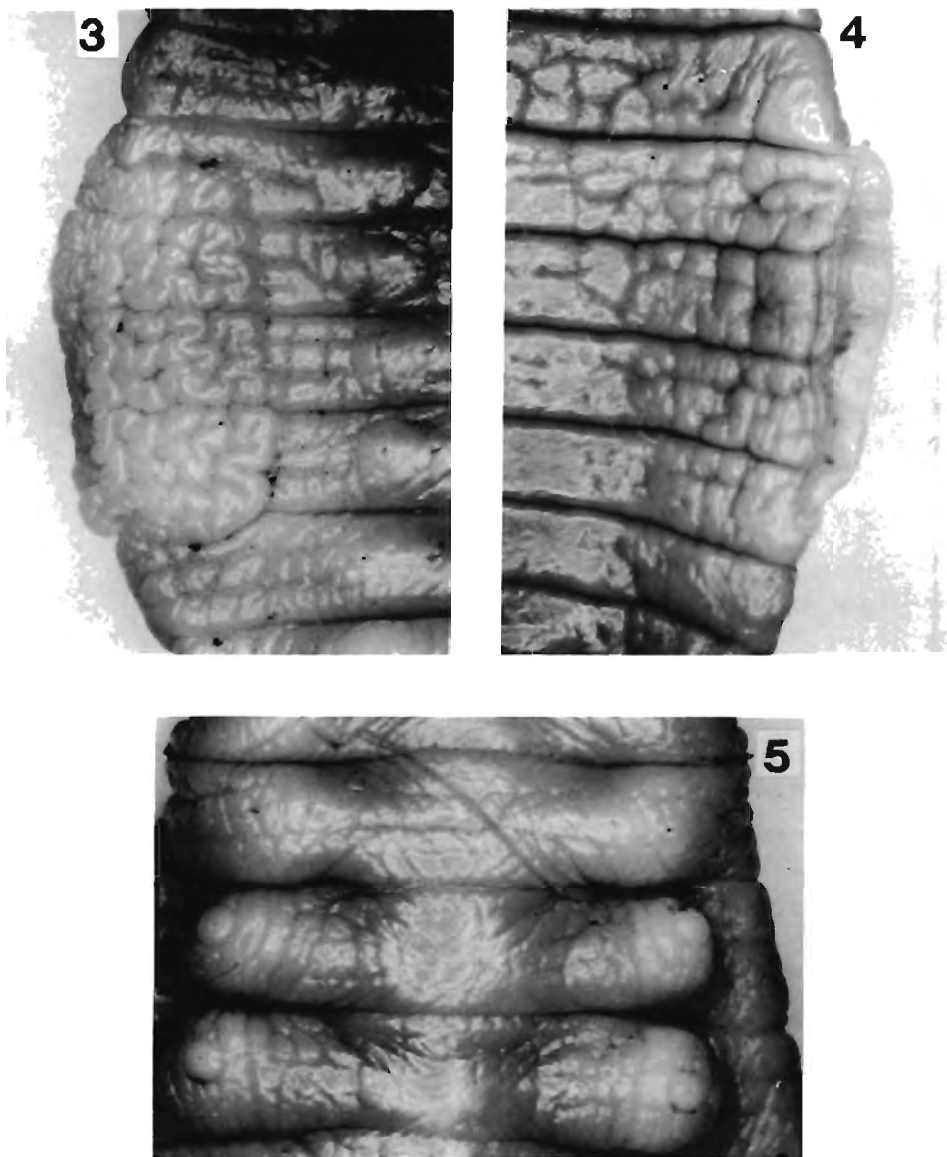
Septa: 4/5 thin—but strong and elastic, 5/6 and 6/7 thin, delicate; 7/8 and 8/9 very thick, muscular, massive; their external sides are adherent to body walls; both septa supported by internal, *circa* 3 mm long, longitudinal musculus; in some specimens the thickness of septa extended to 2 mm;

Gizzard: In segment 7, large, pear-shaped.

Calciferous glands: One pair of hemispherical, dorsally and medially separated, glands; in segment 9.

Intestine: Commences in segment 12.

Dorsal blood vessel: Partially doubled, closely adherent or separated, always single at septa; in segment 5 doubled only in quarter of its length; in 6 doubled and separated; in 7 doubled in half of its length; in 8 doubled, separated; in 9 as a cordiform organ. In 10 and the following segments single.



Figs 3-5. *Microchaetus caementarii* Michaelsen, 1913. 3. Tubercula pubertatis with copulatory cushions, ventrally. 4. Dorsal 'rim' of tubercula pubertatis. 5. Papillae.

Paired dorsoventral commissural vessels: in 5–11; in 5–8 as thin tubes; in 9–11 much enlarged, moniliform ‘hearts’.

Nephridia: One pair of large meganephridia per segment. Thick coiled loops medially with large J-shaped caeca.

Spermiductal funnels: Two pairs, enclosed into sacs; in segment 10 and 11 (holandric).

Vesiculae seminales: Large sacs in 10 and 11.

Spermathecae: Minute, oblong or globular, deeply embodied in body wall and difficult to trace; close to intersegmental furrows 11/12 and 12/13. Number of spermathecae not in accord with spermathecal pores.

Ovaries: Not seen.

Genital glands: Oblong, sausage-shaped glands (Fig. 6), in segments 14, 15, 19, or in other, corresponding with some of papillae.

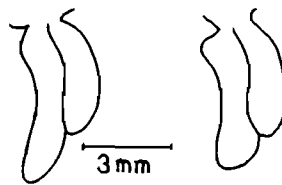


Fig. 6. Genital glands of *Microchaetus caementarii* Michaelsen, 1913.

Microchaetus marleyi Michaelsen, 1928

Microchaetus marleyi Michaelsen, 1928:4; Reynolds & Cook, 1976:134

Michaelsen described this species on ‘a few’ badly preserved specimens. One specimen dissected and examined by Michaelsen, deposited in the NMSA, is certainly a paratype. The holotype and other paratypes are deposited in ZMUH under No. 10435 (Reynolds & Cook 1976).

Material examined: Paratype: [SA, Natal]: ‘Melmoth [28°32’S:31°25’E] Distr[ict], Zululand, H. W. Bell Marley leg. 30 July 1927’. One alcohol-preserved, abnormally stretched up to 380 mm, semimature, dissected, decomposed specimen. NMSA Type No. 450 (old accession No. 1172). NMSA/Olig.00261.

Due to bad preservation and decomposition of the specimen, examination of the external and anatomical characters is impossible.

Microchaetus warreni Michaelsen, 1913

Fig. 7–8

Microchaetus warreni Michaelsen, 1913b: 547; 1918: 326.

Chilota (*Parachilota*) *warreni* [partim]; Reynolds & Cook, 1976: 189.

Described on three mature and one juvenile specimens; one mature, well preserved paratype, dissected by Michaelsen, is deposited in the NMSA. The other three (type and paratypes) in ZMUH under Type Nos: 7500, 7521, 7765.

Reynolds & Cook (1976), state that *M. warreni* is synonym of *Chilota* (*Parachilota*) *warreni* and that the material is deposited in BMNH 1937:7:1:1368-9 and in ZMUH. This information is incorrect: *M. warreni* and *Chilota warreni* are two good species belonging to two different genera; the NMSA is in possession of paratypes of both species. Additional information on the topic can be found in a Michaelsen letter of 13 June 1913, to Dr Warren, 'Studying the new material I have found a very interesting new *Microchaetus* among the worms from Port St. John [Johns] in Pondoland. To this new species I now give the name of *Microchaetus warreni* . . .'. Material recorded in the 'Catalogue' as deposited in BMNH belongs to *Chilota* (*Parachilota*) *warreni*.

Material examined: Paratype: [SA, Cape Province], 'Port St. John [Johns: 31°37'S:29°35'E] Pondoland; Dr E. Warren leg., January 1912'. One mature, very well alcohol-preserved, dissected specimen. In the jar are two labels: one gives collection data, the second, in Michaelsen's handwriting, gives the genus and species names, followed by an abbreviation of his surname. This material was overlooked and not recorded in the Museum's catalogue. Accession No. NMSA/Olig.00271.

New records: SA, Transkei, 26 km N of Umtata (31°35'S:28°48'E) along of national road N2: grassland, on the bank of small local stream; from wet, but not saturated, black soil; 2 clitellate and 5 juveniles; 17 January 1990, J. D. Plisko & B. R. Stuckenberg leg., alcohol preserved; NMSA/Olig.00504.

Comments on paratype and new material:

External and internal characters are in accord with Michaelsen's description. Tubercula pubertatis with characteristic small invagination (Figs 7–8) evident. Although a part of vesiculae seminales and testicle sacs are somewhat decomposed in paratype, in new material they are evident as one pair, enclosed in small testicle sacs, in segment 10; this confirms Michaelsen's separation of this species from *M. pondoanus* Michaelsen, 1913 and allows inclusion of *M. warreni* among the proandric species.

Nephridia were not studied by Michaelsen; my examination of the material shows that they are of the meganephridial type, one pair per segment, and differ somewhat from nephridia of other *Microchaetus* species: looped coils, positioned laterally, less coiled, with longer loops; caeca oblong.

Microchaetus natalensis (Kinberg, 1867)

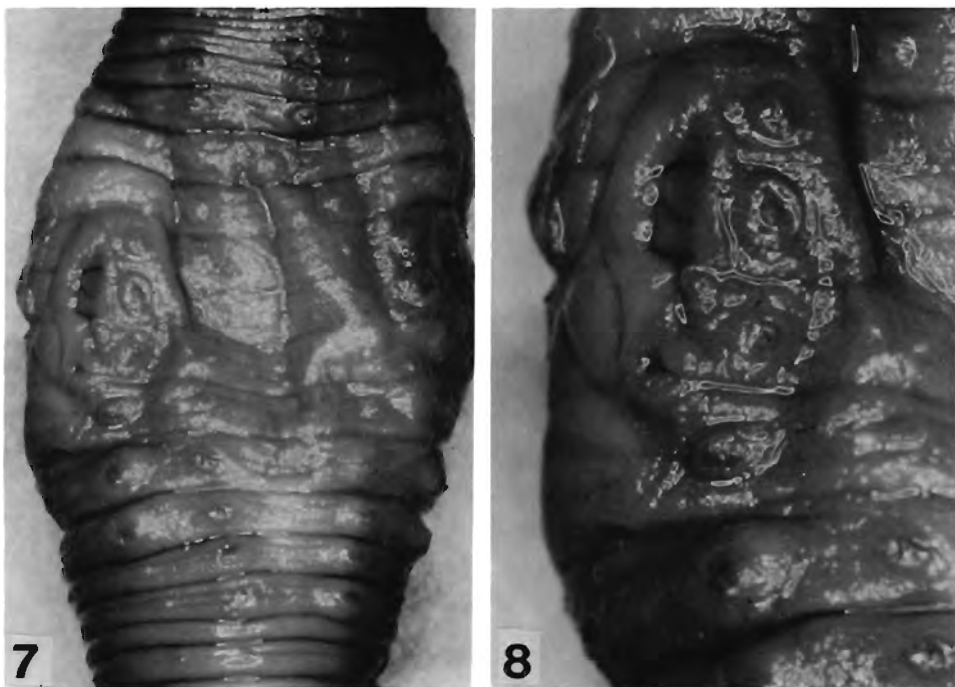
Figs 9–12

Geogenia natalensis Kinberg, 1867:100; Perrier, 1886:876; Beddard, 1895:636; Michaelsen, 1899:428.

Geogenia [? *Microchaetus*] *natalensis*; Michaelsen, 1900:462.

Microchaetus natalensis; Michaelsen, 1913a:422; 1918:324.

Geogenia natalensis was described by Kinberg (1867), in a new genus, as the third known microchaetid species, following *M. microchaetus* Rapp, 1849 and *Trigogenia sulcata* Kinberg, 1867. The description was based on immature material collected in 'Port Natal' (= Durban), using limited external characters. Because of the inadequate description, Perrier (1886) and Beddard (1895) were not certain of



Figs. 7–8. *Microchaetus warreni* Michaelsen, 1913. 7. Clitellar region ventrally. 8. Tuberculum pubertatis.

the systematic position of the species. Type material was revised by Michaelsen (1899), and a description of immature specimens was supplied; however in his following publication Michaelsen (1900) labelled species with a question mark, suggesting possible transfer to *Microchaetus*. In his letter of 13 May 1913, addressed to Dr. Warren, Michaelsen wrote, '*Geogenia natalensis* Kinberg is a species inquirenda'. During his visit to South Africa, when working on the material from Natal and Zululand, in the NMSA, Michaelsen found new *M. natalensis* material, collected at Pietermaritzburg. He wrote, 'I have examined seven specimens in addition to the type specimen. I am convinced that the specimens collected by Dr Warren and W. G. Rump at Pietermaritzburg belong to this species [*natalensis*], although they seem to differ considerably from the type. It is probable that these differences depend upon the different state of development, as the type is not quite mature'.

Three of these examined specimens (from two samples) are in the NMSA. All are well preserved. None of the material examined by Michaelsen was recorded by Reynolds & Cook (1976). Kinberg's type material is in NHRS, registered under No. 158 (Reynolds & Cook 1976).

Material examined: [SA, Natal]: 'Pietermaritzburg [29°35'S:30°25'E] Scottsville, W. G. Rump [leg.] December 1911'; one mature and one juvenile specimens, alcohol-preserved, not dissected. NMSA/Olig.00265. 'Pietermaritzburg, in a

garden, Dr E. Warren leg., September 5th, and December 1911'; one mature, autotomised into three pieces: preclitellar part dissected. Alcohol-preserved. NMSA/Olig.00269. Both tubes contain locality labels and '*M. natalensis*, Kinb.' in Michaelsen's handwriting.

New records: Natal: Mfongozi [28°42'S:30°48'E], Zululand; 19 March 1913, W. E. Jones pres. [leg.]. 8 mature, well preserved specimens, one dissected by myself; NMSA/Olig.00348. On the bank of Umgeni River, near Karkloof Falls Nature Reserve, Safari World, (29°25'S:30°18'E), ca 800 m asl; from wet soil at 1–20 cm depth. 6 December 1989, 4 juveniles; NMSA/Olig.00468. Otto's Bluff (29°30'S:30°23'E), on the bank of local river, 5 clitellate and 8 juveniles; 6 December, 1989, NMSA/Olig.00313. Pietermaritzburg (29°35'S:30°25'E): at the corner of Boshoff & Longmarket Street, from wet soil of city lawns. 5 March 1989, 8 whole specimens, 2 abscised anterior mature parts, and 4 juvenile specimens; NMSA/Olig.00362. Scottsville, Golf-Course: after rain, collected from the surface, between grasses, 1 clitellate specimen, 5 January 1989; NMSA/Olig.00463. From first 1–10 cm of fallow ground, 1 clitellate and 1 juvenile; 10 November 1989; preserved in formaldehyde; NMSA/Olig.00472. Hayfields, near Adams Rd., bush, dry soil; 1 clitellate and two immature; 10 November 1989; NMSA/Olig.00380. Sports-Fields, near Alexandra Rd, from first 1–20 cm of wet soil, 2 clitellate, 14 February 1989; NMSA/Olig.00456. Scottsville Ext., at the exit to Richmond, in dumping area; from wet soil; 6 mature and 9 juveniles; 10 November 1989; NMSA/Olig.00397. Cleland, from garden soil of Mr C. Shaw garden; 1 clitellate specimen; 29 November 1989; NMSA/Olig. 00454. Ashburton 29°40'S:30°27'E), from the watered during winter time, Mrs A. Kunz, garden. 5 mature and 6 juveniles, 19 September 1990; NMSA/Olig. 00320.

All new material (with the exception of those from Zululand) collected by J. D. Plisko.

Redescription of material examined by Michaelsen:

External and anatomical characters agree with Michaelsen (1913a) description, with some exceptions: setae noticeable on segment 2 (and not on 3). Septum 4/5 somewhat thinner and not so massive as 7/8 and 8/9. In Michaelsen's description they are 'extraordinarily strong'. Hemispherical calciferous glands in segment 9 projecting into segment 10 are closely adherent laterally to oesophagus; dorsally clearly separated by a broad furrow. Intestine commences in segment 13.

Michaelsen's short comment 'Dorsal blood vessel simple' does not correspond with the vessel in specimen he dissected: it is doubled, the two tubes closely attached to one another tube in segments 6 and 7; doubled and separated in segment 8, creating a cordiform organ in segment 9. The dorsoventral vessels are thin tubes in segments 5–7, in 8 as moniliform thin tubes, in 9–11 enlarged, moniliform, conspicuous 'hearts'.

Nephridia not described previously. Michaelsen (1913a) recorded only nephridial pores, which are noticeable in other *Microchaetus* species, and this character enabled him to place this species in *Microchaetus*: however, the shape and size of nephridium were not noted. They are: one pair of meganephridium per segment; the coiled loops medial; caeca large.

Description of new material:

External characters

General: Body cylindrical, slightly flattened at clitellar region.

Colour: In life—dorsally violet-grey, medially pale grey. Alcohol-preserved—dorsally smoke-grey with violet tint, ventrally light grey.

Dimensions: Alcohol-preserved mature specimens: 96–270 mm long; 5–8 mm wide at segment 10; 6–12 in clitellar region.

Segments number: 197–307.

Prostomium: Prolobous (Fig. 9).

Segmentation: Segments 1–3 simple, with longitudinal grooves; 1 not distinguished from 2; 4–9 divided into 2 simple ringlets similar appearance: first ringlet slightly larger than second; 10–12 simple, equal size to first ringlet of 4–5 segments. Following segments simple, randomly demarcated by transverse lines.

Setae: Closely paired; first pairs randomly noticeable on second or third segment, more often on first ringlet of four segment; preclitellarly $aa < bc$, diminishing its distance on clitellar segments; postclitellarly $aa > bc$, $ab = cd$, $dd =$ about half u .

Nephridial pores: Conspicuous, first pair in $3/4$ intersegmental furrow, in front of c setal lines.

Female pores: Paired; on 14, between aa setal lines.

Male pores: One pair, inconspicuous, in $16/17$ intersegmental furrow; in area of genital fields.

Spermathecal pores: Noticeable with difficulty; in $13/14$ and $14/15$ intersegmental furrows, various number: from one to a few.

Clitellar region

Clitellum: Saddle shaped, dark brown or yellowish, divided by intersegmental furrows (Fig. 10); on 13–22, 23, laterally extended up to one quarter of space between aa setal lines.

Tubercula pubertatis: Nearly square, glandular ridges, on segments 15–18; dorsally begin in cd setal lines and extend up to bc setal lines; genital fields in form of thick, glandular cushions (Fig. 11), demarcated with irregular grooves, on 16–18.

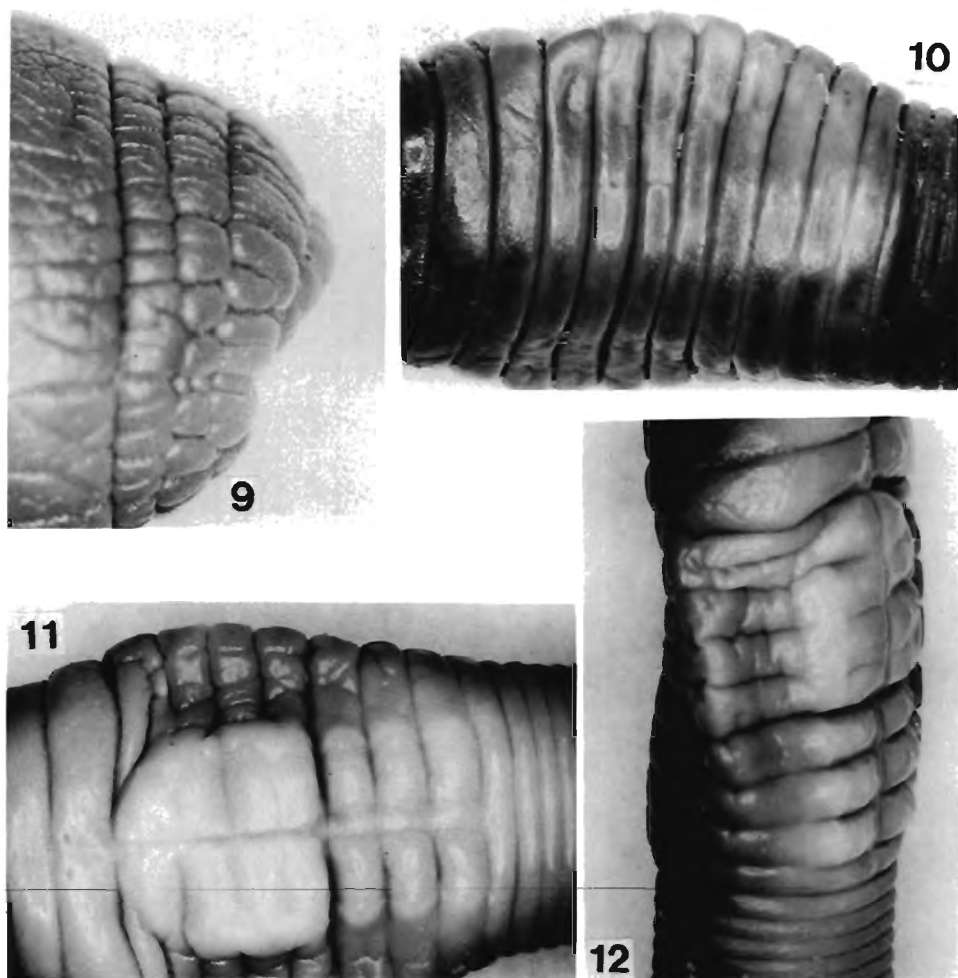
Papillae: Square shaped, thick, distinct, in ab setal lines, on 10–22 segments; occupy ventrally large part of clitellar region: only a very narrow, distinct, longitudinal furrow is not glandular and divide the rows of papillae (Fig. 12).

Internal characters

Septa: $4/5$ thickened, elastic and strong; $5/6$ and $6/7$ very thin, delicate; $7/8$ and $8/9$ very much thickened, massive, muscular, thick. The following septa delicate.

Gizzard: Globular, in segment 7.

Calciferous glands: In segment 9, slightly projecting into 10; one pair of hemispherical glands, laterally adherent to oesophagus; dorsally separated by distinct furrow.



Figs 9–12. *Microchaetus natalensis* (Kinberg, 1867). 9. Prostomium. 10–12. Clitellar region: 10. Dorsally. 11. Ventrally. 12. Ventro-laterally.

Intestine: Commences in 13 segment.

Vascular system

Dorsal blood vessel: In segment 5 single, doubled only in posterior part for one quarter of its length; 6–8 doubled, partially divided; in 9 cordiform organ, built from two enlarged vessels, closely positioned and enclosed in strong vessel's tissue; single at crossing septa and in all following segments. Paired dorsoventral commissural vessels in 5–11: thin tubes in 5–7, slightly enlarged in 8, very much enlarged, moniliform 'hearts' in 9–11 segments.

Nephridia: One pair per segment; meganephridia; coiled loops and nephrostome laterally. There is small degree of individual variation in the length of caeca:

usually the length of two tubes is equal; however proportions of their length can differ within population.

Spermiductal funnels: Two pairs (holandric) enclosed into two pairs of sacs; in segments 10 and 11. Testes not traced.

Seminal vesicles: Large sacs in 10 and 11, projecting into 11 and 12, respectively.

Spermathecae: Minute, globular or oblong; one or more pairs per segment. Always embodied deeply in body wall, difficult to trace; in some mature specimens seen only after large part of body wall tissue was taken away. In some not seen at all.

Genital glands: Not found.

Genital setae: One seta or more in one oblong tube; large, iridescent; in segments 15–21.

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